

Appendix C

Commonwealth of Virginia Department of Environmental Quality

**Water Quality Standards
For toxic analytes**

Extracted from

STATE WATER CONTROL BOARD

9 VAC 25-260 Virginia Water Quality Standards.

Statutory Authority: § 62.1-44.15 3a of the Code of Virginia.

WITH AMENDMENTS EFFECTIVE JANUARY 12, 2006

Refer to 9 VAC 25-260 for detailed comments on the standards summarized herein!

<http://www.deq.virginia.gov/wqs/>

9 VAC 25-260-140. Criteria for surface water.

A. Instream water quality conditions shall not be acutely² or chronically³ toxic except as allowed in 9 VAC 25-260-20 B mixing zones. The following are definitions of acute and chronic toxicity conditions:

"Acute toxicity" means an adverse effect that usually occurs shortly after exposure to a pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not easily detected, immobilization is considered equivalent to death.

"Chronic toxicity" means an adverse effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

B. The following table is a list of numerical water quality criteria for specific parameters.

When information has become available from the Environmental Protection Agency to calculate additional aquatic life or human health criteria not contained in the table, the board may employ these values in establishing effluent limitations or other limitations pursuant to 9 VAC 25-260-20 A necessary to protect designated uses until the board has completed the regulatory standards adoption process.

Table of Parameters ⁶

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Acenaphthene (µg/l) 83329					1,200	2,700
Acrolein (µg/l) 107028					320	780
Acrylonitrile (µg/l) 107131 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.59	6.6
Aldrin (µg/l) 309002 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	3.0		1.3		0.0013	0.0014
Ammonia (µg/l) 766-41-7 Chronic criterion is a 30-day average concentration not to be exceeded more than once every three 3 years on the average. (see 9 VAC 25-260-155)						
Anthracene (µg/l) 120127					9,600	110,000
Antimony (µg/l) 7440360					14	4,300
Arsenic (µg/l ⁵) 7440382	340	150	69	36	10	
Bacteria (see 9 VAC 25-260-160 and 170)						
Barium (µg/l) 7440393					2,000	
Benzene µg/l 71432 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					12	710
Benzidine (µg/l) 92875 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.0012	0.0054
Benzo (a) anthracene (µg/l) 56553 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.044	0.49

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Benzo (b) fluoranthene (µg/l) 205992 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.044	0.49
Benzo (k) fluoranthene (µg/l) 207089 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.044	0.49
Benzo (a) pyrene (µg/l) 50328 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.044	0.49
Bis2-Chloroethyl Ether 111444 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.31	14
Bis2-Chloroisopropyl Ether (µg/l) 39638329					1,400	170,000
Bromoform (µg/l) 75252 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					44	3,600
Butyl benzyl phthalate (µg/l) 85687					3,000	5,200

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Cadmium (µg/l)⁵ 7440439 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) $WER [e^{\{1.128[\ln(\text{hardness})] - 3.828\}}]$ Freshwater chronic criterion (µg/l) $WER [e^{\{0.7852[\ln(\text{hardness})] - 3.490\}}]$ WER = Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm	3.9 WER = 1 CaCO ₃ =100	1.1 WER = 1 CaCO ₃ = 100	40 WER=1	8.8 WER=1	5	
Carbon tetrachloride (µg/l) 56235 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					2.5	44
Chlordane (µg/l) 57749 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	2.4	0.0043	0.09	0.0040	0.021	0.022
Chloride (µg/l) 16887006 Human Health criterion to maintain acceptable taste and aesthetic quality and applies at the drinking water intake.	860,000	230,000			250,000	
Chlorine, Total Residual (µg/l) 7782505 In DGIF class i and ii trout waters (9 VAC 25-260 subsections 390-540) or waters with threatened or endangered species are subject to the halogen ban (subsection 110.)	19 See 9 VAC 25-260-110	11 See 9 VAC 25-260-110				
Chlorine Produced Oxidant (µg/l) 7782505			13	7.5		
Chlorobenzene (µg/l) 108907					680	21,000

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Chlorodibromomethane (µg/l) 124481 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					4.1	340
Chloroform (µg/l) 67663 Known or suspected carcinogen; however, non-carcinogen calculation used and is protective of carcinogenic effects. Use 30Q5 as default design flow (see footnote 6.)					350	29,000
2-Chloronaphthalene (µg/l) 91587					1,700	4,300
2-Chlorophenol (µg/l) 95578					120	400
Chlorpyrifos (µg/l) 2921882	0.083	0.041	0.011	0.0056		
Chromium III (µg/l)⁵⁰ 16065831 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l $WER[e^{\{0.8190[\ln(\text{hardness})]+3.7256\}}](CF_A)$ Freshwater chronic criterion µg/l $WER[e^{\{0.8190[\ln(\text{hardness})]+0.6848\}}](CF_C)$ WER = Water Effect Ratio = 1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln=natural logarithm CF _A =0.316 CF _C =0.860	570 (WER=1; CaCO ₃ = 100)	74 (WER=1; CaCO ₃ =100)			100 (total Cr)	
Chromium VI (µg/l)⁹ 18540299	16	11	1,100	50		

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Chrysene (µg/l) 218019 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.044	0.49
Copper (µg/l)⁹ 7440508 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) $WER [e^{\{0.9422[\ln(\text{hardness})]-1.700\}}] (CF_a)$ Freshwater chronic criterion (µg/l) $WER [e^{\{0.8545[\ln(\text{hardness})]-1.702\}}] (CF_c)$ WER = Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310. e = natural antilogarithm ln=natural logarithm CF _a = 0.960 CF _c = 0.960 Acute saltwater criterion is a 24-hour average not to be exceeded more than once every three years on the average.	13 WER=1 CaCO ₃ = 100	9.0 WER=1 CaCO ₃ = 100	9.3 WER=1	6.0 WER=1	1,300	
Cyanide (µg/l) 57125	22	5.2	1.0	1.0	700	220,000
DDD (µg/l) 72548 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0083	0.0084
DDE (µg/l) 72559 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0059	0.0059
DDT (µg/l) 50293 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	1.1	0.0010	0.13	0.0010	0.0059	0.0059

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Demeton (µg/l) 8065483		0.1		0.1		
Dibenz (a,h) anthracene (µg/l) 53703 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.044	0.49
Dibutyl phthalate µg/l 84742					2,700	12,000
Dichloromethane (µg/l) 75092 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ Synonym = Methylene Chloride					47	16,000
1,2-Dichlorobenzene (µg/l) 95501					2,700	17,000
1,3- Dichlorobenzene (µg/l) 541731					400	2,600
1,4 Dichlorobenzene (µg/l) 106467					400	2,600
3,3 Dichlorobenzidine 91941 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.4	0.77
Dichlorobromomethane (µg/l) 75274 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					5.6	460
1,2 Dichloroethane (µg/l) 107062 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					3.8	990
1,1 Dichloroethylene (µg/l) 75354					310	17,000
1,2-trans-dichloroethylene (µg/l) 156605					700	140,000

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
2,4 Dichlorophenol (µg/l) 120832					93	790
2,4 Dichlorophenoxy acetic acid (2,4-D) (µg/l) 94757					100	
1,2-Dichloropropane (µg/l) 78875 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					5.2	390
1,3-Dichloropropene (µg/l) 542756					10	1,700
Dieldrin (µg/l) 60571 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.24	0.056	0.71	0.0019	0.0014	0.0014
Diethyl Phthalate (µg/l) 84662					23,000	120,000
Di-2-Ethylhexyl Phthalate (µg/l) 117817 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ . Synonym = Bis2-Ethylhexyl Phthalate.					18	59
2,4 Dimethylphenol (µg/l) 105679					540	2,300
Dimethyl Phthalate (µg/l) 131113					313,000	2,900,000
Di-n-Butyl Phthalate (µg/l) 84742					2,700	12,000
2,4 Dinitrophenol (µg/l) 51285					70	14,000
2-Methyl-4,6-Dinitrophenol (µg/l) 534521					13.4	765

PARAMETER CAS Number	USE DESIGNATION					
	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
2,4 Dinitrotoluene (µg/l) 121142 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					1.1	91
Dioxin 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (ppq) 1746016 Criteria are based on a risk level of 10 ⁻⁵ and potency of 1.75 x 10 ⁴ mg/kg-day ⁻¹ . To calculate an average effluent permit limit, use mean annual stream flow.					1.2	1.2
1,2-Diphenylhydrazine (µg/l) 122667 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.40	5.4
Dissolved Oxygen (mg/l) (See 9 VAC 25-260-50 and 9 VAC 25-260-55)						
Alpha-Endosulfan (µg/l) 959988	0.22	0.056	0.034	0.0087	110	240
Beta-Endosulfan (µg/l) 33213659	0.22	0.056	0.034	0.0087	110	240
Endosulfan Sulfate (µg/l) 1031078					110	240
Endrin (µg/l) 72208	0.086	0.036	0.037	0.0023	0.76	0.81
Endrin Aldehyde (µg/l) 7421934					0.76	0.81
Ethylbenzene (µg/l) 100414					3,100	29,000
Fecal Coliform (see 9 VAC 25-260-160 and 9 VAC 25-260-170)						
Fluoranthene (µg/l) 206440					300	370

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Fluorene (µg/l) 86737					1,300	14,000
Foaming Agents (µg/l) Criterion measured as methylene blue active substances. Criterion to maintain acceptable taste, odor, or aesthetic quality of drinking water and applies at the drinking water intake.					500	
Guthion (µg/l) 86500		0.01		0.01		
Heptachlor (µg/l) 76448 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.52	0.0038	0.053	0.0036	0.0021	0.0021
Heptachlor Epoxide (µg/l) 1024573 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.52	0.0038	0.053	0.0036	0.0010	0.0011
Hexachlorobenzene (µg/l) 118741 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0075	0.0077
Hexachlorobutadiene (µg/l) 87683 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					4.4	500
Hexachlorocyclohexane Alpha-BHC (µg/l) 319846 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.039	0.13
Hexachlorocyclohexane Beta-BHC (µg/l) 319857 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.14	0.46
Hexachlorocyclohexane (µg/l) (Lindane) Gamma-BHC 58899 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.95		0.16		0.19	0.63
Hexachlorocyclopentadiene (µg/l) 77474					240	17,000

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Hexachloroethane (µg/l) 67721 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					19	89
Hydrogen sulfide (µg/l) 7783064		2.0		2.0		
Indeno (1,2,3-cd) pyrene (µg/l) 193395 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.044	0.49
Iron (µg/l) 7439896 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					300	
Isophorone (µg/l) 78591 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					360	26,000
Kepone (µg/l) 143500		zero		zero		
Lead (µg/l)⁵ 7439921 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the water effect ratio. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion (µg/l) $WER[e^{\{1.273[\ln(\text{hardness})]-1.084\}}]$ Freshwater chronic criterion (µg/l) $WER[e^{\{1.273[\ln(\text{hardness})]-3.259\}}]$ WER = Water Effect Ratio =1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm	120 WER=1 CaCO ₃ =100	14 WER=1 CaCO ₃ =100	240 WER=1	9.3 WER=1	15	
Malathion (µg/l) 121755		0.1		0.1		

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Manganese (µg/l) 7439965 Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					50	
Mercury µg/l⁵ 7439976	1.4	0.77	1.8	0.94	0.050	0.051
Methyl Bromide (µg/l) 74839					48	4,000
Methoxychlor (µg/l) 72435		0.03		0.03	100	
Mirex (µg/l) 2385855		zero		zero		
Monochlorobenzene (µg/l) 108907					680	21,000
Nickel (µg/L⁹) 744002 Freshwater values are a function of total hardness as calcium carbonate CaCO ₃ mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l $WER[e^{\{0.8460[\ln(\text{hardness})] + 1.312\}}](CF_a)$ Freshwater chronic criterion (µg/l) $WER[e^{\{0.8460[\ln(\text{hardness})] - 0.8840\}}](CF_c)$ WER = Water Effect Ratio = unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-250-310 e = natural antilogarithm ln = natural logarithm (CF _a)=0.998 (CF _c)=0.997	180 WER=1 CaCO ₃ = 100	20 WER = 1 CaCO ₃ = 100	74 WER=1	8.2 WER=1	610	4,600
Nitrate as N (µg/l) 14797558					10,000	

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Nitrobenzene (µg/l) 98953					17	1,900
N-Nitrosodimethylamine (µg/l) 62759 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.0069	81
N-Nitrosodiphenylamine (µg/l) 86306 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					50	160
N-Nitrosodi-n-propylamine (µg/l) 621647 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.05	14
Parathion (µg/l) 56382	0.065	0.013				
PCB 1260 (µg/l) 11096825		0.014		0.030		
PCB 1254 (µg/l) 11097691		0.014		0.030		
PCB 1248 (µg/l) 12672296		0.014		0.030		
PCB 1242 (µg/l) 53469219		0.014		0.030		
PCB 1232 (µg/l) 11141165		0.014		0.030		
PCB 1221 (µg/l) 11104282		0.014		0.030		
PCB 1016 (µg/l) 12674112		0.014		0.030		

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
PCB Total (µg/l) 1336363 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					0.0017	0.0017
Pentachlorophenol (µg/l) 87865 Known or suspected carcinogen; human health criteria risk level at 10 ⁻⁵ Freshwater acute criterion (µg/l) e _e (1.005(pH)-4.8 69) Freshwater chronic criterion (µg/l) e _e (1.005(pH)-5.134)	8.7 pH = 7.0	6.7 pH = 7.0	13	7.9	2.8	82
pH See § 9VAC25-260-50						
Phenol (µg/l) 108952					21,000	4,600,000
Phosphorus Elemental (µg/l) 7723140				0.10		
Pyrene (µg/l) 129000					960	11,000
Radionuclides Gross Alpha Particle Activity (pCi/L) Beta Particle & Photon Activity (mrem/yr) (formerly man-made radio nuclides) Strontium 90 (pCi/L) Tritium (pCi/L)					15 4 8 20,000	15 4 8 20,000
Selenium (µg/l)⁵⁰ 7782492 WER shall not be used for freshwater acute and chronic criteria.	20	5.0	300 WER=1	71 WER=1	170	11,000
Silver (µg/l)⁵ 7440224 Freshwater values are a function of total hardness as calcium carbonate (CaCO ₃) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400.	3.4 WER=1; CaCO ₃ = 100		2.0 WER=1			

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
Freshwater acute criterion (µg/l) $WER [e^{\{1.72[\ln(\text{hardness})]-6.52\}}] (CF_a)$ WER = Water Effect Ratio = 1 unless shown otherwise under 9 VAC 25-260-140F and listed in 9 VAC 25-260-310 e = natural antilogarithm ln = natural logarithm (CF _a) = 0.85						
Sulfate (µg/l) Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					250,000	
Temperature See 9 VAC 25-260-50						
1,1,2,2-Tetrachloroethane (µg/l) 79345 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					1.7	110
Tetrachloroethylene (µg/l) 127184 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵					8.0	89
Thallium (µg/l) 7440280					1.7	6.3
Toluene (µg/l) 108883					6,800	200,000
Total Dissolved Solids (µg/l) Criterion to maintain acceptable taste, odor or aesthetic quality of drinking water and applies at the drinking water intake.					500,000	
Toxaphene (µg/l) 8001352 The chronic aquatic life criteria have been calculated to also protect wildlife from harmful effects through ingestion of contaminated tissue. Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .	0.73	0.0002	0.21	0.0002	0.0073	0.0075
Tributyltin (µg/l) 60105	0.46	0.063	0.38	0.001		

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	AQUATIC LIFE				HUMAN HEALTH	
	FRESHWATER		SALTWATER		Public Water Supply ³	All Other Surface Waters ⁴
	Acute ¹	Chronic ²	Acute ¹	Chronic ²		
1, 2, 4 Trichlorobenzene (µg/l) 120821					260	940
1,1,2-Trichloroethane (µg/l) 79005 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					6.0	420
Trichloroethylene (µg/l) 79016 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					27	810
2, 4, 6-Trichlorophenol 88062 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					21	65
2-(2, 4, 5-Trichlorophenoxy propionic acid (Silvex) (µg/l)					50	
Vinyl Chloride (µg/l) 75014 Known or suspected carcinogen; human health criteria at risk level 10 ⁻⁵ .					0.23	61
Zinc (µg/l)⁵ Freshwater values are a function of total hardness as calcium carbonate (CaCO ₃) mg/l and the WER. The minimum hardness allowed for use in the equation below shall be 25 and the maximum, hardness shall be 400 even when the actual ambient hardness is less than 25 or greater than 400. Freshwater acute criterion µg/l $WER [e^{\{0.8473[\ln(\text{hardness})]+0.884\}}] (CF_a)$ Freshwater chronic criterion µg/l $WER [e^{\{0.8473[\ln(\text{hardness})]+0.884\}}] (CF_c)$ WER=Water Effect Ratio=1 unless shown otherwise under 9 VAC 25-260-140.F and listed in 9 VAC 25-260-310 e = base e exponential function. ln = log normal function CF _a =0.978 CF _c =0.986	120 WER=1 CaCO ₃ =100	120 WER=1 CaCO ₃ =100	90 WER=1	81 WER=1	9,100	69,000

- ¹ One hour average concentration not to be exceeded more than once every 3 years on the average, unless otherwise noted.
- ² Four-day average concentration not to be exceeded more than once every 3 years on the average, unless otherwise noted.
- ³ Criteria have been calculated to protect human health from toxic effects through drinking water and fish consumption, unless otherwise noted and apply in segments designated as PWS in 9 VAC 25-260-390-540.
- ⁴ Criteria have been calculated to protect human health from toxic effects through fish consumption, unless otherwise noted and apply in all other surface waters not designated as PWS in 9 VAC 25-260-390-540.
- ⁵ Acute and chronic saltwater and freshwater aquatic life criteria apply to the biologically available form of the metal and apply as a function of the pollutant's water effect ratio (WER) as defined in 9 VAC 25-260-140 F (WER X criterion.) Metals measured as dissolved shall be considered to be biologically available, or, because local receiving water characteristics may otherwise affect the biological availability of the metal, the biologically available equivalent measurement of the metal can be further defined by determining a Water Effect Ratio (WER) and multiplying the numerical value shown in 9 VAC 25-260-140 B by the WER. Refer to 9 VAC 25-260-140 F. Values displayed above in the table are examples and correspond to a (WER) of 1.0. Metals criteria have been adjusted to convert the total recoverable fraction to dissolved fraction using a conversion factor. Criteria that change with hardness have the conversion factor listed in the table above.

6 = The flows listed below are default design flows for calculating steady state waste load allocations unless statistically valid methods are employed which demonstrate compliance with the duration and return frequency of the water quality criteria.

Aquatic Life:

Acute criteria	1Q10
Chronic criteria	7Q10
Chronic criteria (ammonia)	30Q10

Human Health:

Non-carcinogens	30Q5
Carcinogens	Harmonic mean (An exception to this is for the carcinogen dioxin. The applicable stream flow for dioxin is the mean annual stream flow.)

The following are defined for this section:

"1Q10" means the lowest flow averaged over a period of one day which on a statistical basis can be expected to occur once every 10 climatic years.

"7Q10" means the lowest flow averaged over a period of seven consecutive days that can be statistically expected to occur once every 10 climatic years.

"30Q5" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every five climatic years.

"30Q10" means the lowest flow averaged over a period of 30 consecutive days that can be statistically expected to occur once every 10 climatic years.

"Averaged" means an arithmetic mean.

"Climatic year" means a year beginning on April 1 and ending on March 31.

C. Application of freshwater and saltwater numerical criteria.

The numerical water quality criteria listed in subsection B of this section (excluding dissolved oxygen, pH, temperature) shall be applied according to the following classes of waters (see 9 VAC 25-260-50) and boundary designations:

CLASS OF WATERS	NUMERICAL CRITERIA
I and II (Estuarine Waters)	Saltwater criteria apply
II (Transition Zone)	More stringent of either the freshwater or saltwater criteria apply
II (Tidal Freshwater,) III, IV, V, VI and VII	Freshwater criteria apply